Cold Electronics Consortium Deliverables:

1. Hardware Deliverables
   1. Front-end ASIC
      1. Design
      2. Production
      3. Testing
   2. ADC ASIC
      1. Design
      2. Production
      3. Testing
   3. COLDATA ASIC
      1. Design
      2. Production
      3. Testing
   4. Front-end Motherboards
      1. Design
      2. Production
      3. Testing
   5. Cold Low-voltage Cables
      1. Selection/Validation
      2. Fabrication/Procurement
      3. Testing
   6. Cold Bias-voltage Cables
      1. Selection/Validation
      2. Fabrication/Procurement
      3. Testing
   7. Cold Signal Cables
      1. Selection/Validation
      2. Fabrication/Procurement
      3. Testing
   8. APA Electronics Infrastructure
      1. Develop Cable Routing Plan
      2. Design FEM boxes and Cable Support Structures
      3. Fabricate FEM boxes and Cable Support Structures
      4. Develop Installation Plan
      5. Install electronics/cables on APAs (Integration Facility?)
      6. Test electronics/cables on APAs (Integration Facility?)
   9. Signal Flanges
      1. Develop Cable Routing Plan
      2. Design Flange and Cable Support Structures
      3. Procure/Fabricate Flange and Cable Support Structures
      4. Develop Plan for connecting cables to feed-throughs
      5. Install cables to feed-throughs during APA installation (SURF)
   10. Cold Electronics Feed-through
       1. Design
       2. Fabrication
       3. Testing
   11. Warm-electronics Crate and Backplane
       1. Design
       2. Backplane fabrication
       3. Backplane testing
       4. Fabrication of mechanical crate components
       5. Crate Assembly
       6. Installation of crates on feed-throughs (SURF)
   12. Warm Interface Boards
       1. Design
       2. Firmware Development
       3. Fabrication
       4. Testing
       5. Installation and Commissioning (SURF)
   13. Power & Timing Cards
       1. Design
       2. Fabrication
       3. Testing
       4. Installation and Commissioning (SURF)
   14. Warm Low-Voltage Cables
       1. Selection/Validation
       2. Fabrication/Procurement
       3. Testing
   15. Warm Bias-Voltage Cables
       1. Selection/Validation
       2. Fabrication/Procurement
       3. Testing
   16. Low-Voltage Power Supplies
       1. Selection/Validation
       2. Procurement
       3. Testing
   17. Bias-Voltage Supplies
       1. Selection/Validation
       2. Procurement
       3. Testing
2. Software Deliverables
   1. Simulation Code
      1. Analog Signal Processing
      2. Digital Readout
   2. Calibration
      1. Run Control Software
      2. Analysis Software
      3. Calibration Database
   3. Hardware Database
      1. QC Documentation
      2. Component Tracking
   4. Data Collection
      1. Hardware Initialization/Configuration Code
      2. Hardware Monitoring Code
   5. Data Monitoring Code
3. Physics Deliverables
   1. Validation of Cold Electronics Requirements with respect to Physics Performance
   2. Cold Electronics Performance Validation via ProtoDUNE Data Analysis
   3. Editing of TDR chapter
4. Integration Deliverables
   1. Detector Grounding & Shielding Plan
   2. Integration Test Facility
      1. Design
      2. Fabrication
      3. Operation